DOCUMENT RESUME

ED 092 698 CE 001 427

TITLE	Auto Body Welding 2 (Course Outline), Automotive Body Repair and Refinishing 1: 9033.04.
INSTITUTION	Dade County Public Schools, Miami, Fla.
PUB DATE	73
NOTE	20p.; An Authorized Course of Instruction for the Quinmester Program
EDRS PRICE	MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS	*Auto Body Repairmen; Behavioral Objectives; *Curriculum Guides; High School Curriculum; Job Skills; Skilled Workers; *Trade and Industrial Education
IDENTIFIERS	*Quinmester Program

ABSTRACT

The 90-hour course is a foundation quinmester course in welding for the auto body repairman. The outline consists of seven blocks of instruction (orientation, 6 hours; auto body oxyacetylene welding, 10 hours; electric arc welding equipment, 6 hours; auto body electric arc welding, 8 hours; position welding, 40 hours; electric spot welders, 16 hours; and welding safety, 4 hours), each of which is subdivided into several units which list student competencies. Instruction will consist of demonstrations, lectures, group discussions, audiovisual aids, and resource people from industry. Instruction should be flexible to meet individual needs and abilities. A bibliography lists three references, six supplementary references, and six films. A 25-item multiple choice posttest sample is included. (SC)

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THORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

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Course Outline
AUTOMOTIVE BODY REPAIR AND REFINISHING 1 - 9033
(Auto Body Welding II)
Department 48 - Quin 9033.04

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1973

ED 092698

D A D E C O U N T Y P U B L I C S C H O O L S

1 4 5 0 N O R T H E A S T S E C O N D A V E N U E

M I A M I, F L O R I D A 33132

Course Outline

AUTOMOTIVE BODY REPAIR AND REFINISHING 1 - 9033
(Auto Body Welding II)

Department 48 - Quin 9033.04

county office of

VOCATIONAL AND ADULT EDUCATION

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Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

January, 1973

Published by the School Board of Dade County

COURSE DESCRIPTION

9033	48	9033.04	AUTO BODY WELDING II
State Category Number	County Dept. Number	County Course Number	Course Title

This quinmester course is designed as only one of a group of quinmester courses offered in the field of auto body repairs. The student will receive the general information, technical knowledge, basic skills, attitudes and values that are required for job entry level as auto body repair helper. This is an advanced course in automotive welding techniques as described in Automotive Welding I. This course will be given in a 9-week period.

Indicators of success: The applicant must demonstrate an eighth grade equivalency score in reading and math. Also have average ability in mechanical aptitudes.

Clock hours 90

PREFACE

The following quinmester course outline is a guide to help students become employable with skills, knowledge, attitudes and values necessary for performing the required service of the automotive body repair trainee.

This course is designed as a foundation quinmester course for the auto body repair trainee. This outline consists of eight blocks of instruction which are subdivided into several units each. It is only one part of a series of quinmester outlines designed for the complete auto body repair trainee. This course is 90 hours in length.

Prerequisite for this course is as follows: The student should have an eighth grade equivalency score in reading, comprehension, arithmetic fundamentals and mechanical aptitude. The student must be physically and mentally able to profit from this training.

Prior to entry into this course, the vocational student will display mastery of the skills indicated in Auto Body Welding I (9033.03).

Instruction will consist of demonstrations, lectures, group discussions, audio visual aids and resource people from industry. Instruction will be flexible to meet individual needs and abilities.

The bibliography appearing on the last page of this outline lists several basic references; also supplementary references and audio visual aids.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee and the Vocational Curriculum Materials Service and has been approved by the Dade County Vocational Curriculum Committee.

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with Suggested Hourly Breakdown

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GOALS

The auto body repair trainee must be able to:

1. Demonstrate an understanding of the oxy-acetylene welding processes.
2. Demonstrate an understanding of the electric arc-welding equipment and accessories.
3. Demonstrate an understanding of the electric arc-welding processes.
4. Demonstrate an understanding of all types of position welding.
5. Demonstrate an understanding of the electric spot welders.
6. Demonstrate an understanding of all welding safety precautions.
7. Satisfactorily complete the post test.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - ORIENTATION

The student must be able to:

1. List shop rules by written assignment.
2. List safety rules by written assignment.
3. Explain what will be expected of him in the auto body welding repairs by oral or written assignment.
4. List the opportunities that are available for a career in the auto body occupation by written assignment.
5. Exhibit pride and respect for craftsmanship by his actions in the shop or laboratory.
6. Demonstrate an understanding and acceptance of his duties and responsibilities by his performance in the shop or laboratory.

BLOCK II - AUTO BODY OXY-ACETYLENE WELDING

The student must be able to:

1. List the types of oxy-acetylene welding processes by written assignment.
2. List the methods of oxy-acetylene welding processes by written assignment.
3. Demonstrate all oxy-acetylene position welding by performance in the shop.
4. Explain the oxy-acetylene cutting processes orally.

BLOCK III - ELECTRIC ARC WELDING ASSEMBLY

The student must be able to:

1. List the type of electric arc welding processes by written assignment.
2. List the methods of electric arc welding processes by written assignment.
3. List the types of arc welding electrodes by written assignment.
4. List the arc welding equipment by written assignment.
5. List the arc welding accessories by written assignment.

BLOCK IV - AUTO BODY ELECTRIC ARC WELDING

The student must be able to:

1. Explain the electric arc welding theory orally.
2. Explain the electrical terms used in electric arc welding processes by written assignment.
3. List the welding terms used in electric arc welding processes by written assignment.
4. Demonstrate the different types of running beads by performance in the shop.

BLOCK V - POSITION WELDING

The student must be able to:

1. List the types of electric arc weld joints used in the flat position by written assignment.
2. Perform the types of electric arc welding beads used in the horizontal position by performance in the shop.
3. Perform the types of electric arc weld joints used in the shop.
4. List the types of electric arc welding beads used in the overhead position by written assignment.

BLOCK VI - ELECTRIC SPOT WELDERS

The student must be able to:

1. List the types of electric spot welders by written assignment.
2. Exhibit the ability to properly use the electric resistance spot welders by performance in the shop.
3. Exhibit the ability to properly use the electric arc spot welding gun by performance in the shop.
4. List the advantages of electric spot welding by written assignment.

BLOCK VII - WELDING SAFETY

The student must be able to:

1. List the safety precautions pertaining to oxy-acetylene welding by written assignment.
2. List the safety precautions pertaining to electric arc welding by written assignment.
3. List the safety precautions pertaining to electric spot welding by written assignment.

BLOCK VIII - QUINMESTER POST TEST

The student must be able to:

1. Satisfactorily complete the quinmester post-test.

Course Outline

AUTOMOTIVE BODY REPAIR AND REFINISHING 1 - 9033
(Auto Body Welding II)

Department 48 - Quin 9033.04

I. ORIENTATION

A. Objectives of Course
   1. Standards
   2. Methods of evaluation
      a. Oral test
      b. Written test
      c. Manipulation
      d. Diagnosis and job performance

B. Student Benefits
   1. Opportunities for employment
      a. Job opportunities
      b. Scope of trade
   2. Qualification for employment
      a. Job competency
      b. Attitude
      c. Dependability
      d. Pride of workmanship
      e. Experience
      f. Trade certificate
      g. Foundation for more education and training

C. Student Responsibilities
   1. Safety regulations
   2. School policies and expenses
   3. Shop rules and procedures
      a. Use and care of equipment
      b. Care of hand tools
      c. Appropriate dress
      d. Reporting loss of equipment
      e. Housekeeping

II. AUTO BODY OXY-ACETYLENE WELDING

A. Oxy-acetylene Welding Processes
   1. Types
      a. Fusion
      b. Brazing
   2. Methods
      a. Hand tools
      b. Machine torch

B. Oxy-acetylene Position Welding
   1. The flat position
   2. The vertical position
   3. The horizontal position

II. AUTO BODY OXY-ACETYLENE WELDING (Contd.)

a. Butt weld
b. Lap weld
c. Corner weld
d. Buttonhole weld
e. Tack weld

C. Oxy-acetylene Cutting Process
1. Types
2. Methods
a. Hand torch
b. Machine ~~torch~~

III. ELECTRIC ARC WELDING EQUIPMENT

A. Arc Welding Assembly
1. Types
a. Electric arc welding
b. Electric resistance welding
c. Electric spot welding
2. Methods
a. Hand
b. Machine

B. Arc Welding Electrodes
1. Types
a. Mild steel
b. Alloy steel
2. Identify
a. Symbol code
b. Color code

C. Arc Welding Accessories
1. Types
2. Shop equipment
a. Helmet
b. Goggles
c. Gloves
d. Apron and clothes
e. Electrode holder
f. Cleaning tools
(1) Steel brush
(2) Chipping hammer
(3) Cold chisel
(4) Ball pein hammer

IV. AUTO BODY ELECTRIC ARC WELDING

A. Types of Electric Arc Welding Theory and Processes
   1. D.C. welders
   2. A.C. welders

B. Electrical Terms
   1. Circuit
   2. Amperes
   3. Voltage
   4. Voltage drop
   5. D.C. and A.C. current
   6. Open circuit voltage
   7. Arc voltage

C. Welding Terms
   1. Welding position
   2. Electrodes
   3. Base or parent metal
   4. Bead
   5. Ripple
   6. Pass
   7. Crater
   8. Penetration
   9. Joints

D. Running Beads
   1. Starting an arc
   2. Running a stringer bead
   3. Weave bead
   4. Build up weave bead
   5. Single pass build-up

V. POSITION WELDING

A. Flat Position
   1. Butt joint
   2. Lap joint
   3. Corner weld
   4. Fillet T weld

B. Horizontal Position
   1. Straight beads
   2. Single pass lap joint
   3. Multiple pass fillet T joint
   4. Multiple butt joint

C. Vertical Position
   1. Vertical butt joint
   2. Vertical lap joint
   3. Vertical T joint
   4. Vertical downward weld
   5. Upward welding
   6. Rocking the electrode

V. POSITION WELDING (Contd.)

D. Overhead Position
   1. Straight beads
   2. Overhead lap joint
   3. Overhead butt joint
   4. Overhead T joint
   5. Body position

VI. ELECTRIC SPOT WELDERS

A. Resistance Spot Welder
   1. Control switch
   2. Electrodes
   3. Step down transformer
   4. Heavy duty conductors

B. Arc-Spot Welding Gun
   1. Control switch
   2. Arc weld
   3. Electrode

C. Advantages of Electric Spot Welders
   1. Less distortion
   2. Lower voltage
   3. Adjustable
   4. Safer

VII. WELDING SAFETY

A. Oxy-acetylene Welding Safety
   1. Check equipment
   2. Goggles
   3. Friction torch lighter
   4. Proper clothing
   5. Fire extinguisher

B. Electric Arc and Spot Welding Safety
   1. Check equipment
   2. Electric welding helmet
   3. Proper clothing
   4. Fire extinguisher

VIII. QUINMESTER POST TEST

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(Auto Body Welding II)

Basic References:

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Supplementary References:

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9. Tobolt, Bill. Auto Body Repairing and Repainting. Chicago: The Goodheart-Wilcox Co., Inc., 1960. Pp. 224.

Films:

		Dade Co. No.
1.	Inside of Arc Welding, Flat Position. 16 mm. 10 min. Color Sound. 1942. General Electric Co.	816
2.	Inside of Arc Welding, Horizontal Position. 16 mm. 10 min. Color. Sound. 1942. General Electric Co.	817
3.	Inside of Arc Welding, Overhead Position. 16 mm. 10 min. Color. Sound. 1942. General Electric Co.	819
4.	Inside of Arc Welding, Vertical Position. 16 mm. 10 min. Color. Sound. 1942. General Electric Co.	818
5.	Oxy-acetylene Welding, Light Metal. 16 mm. 21 min. B/W. Sound. 1944. United World Films, Inc.	592
6.	Resistance Welding. 16 mm. 10 min. B/W. Sound. 1947	726

A P P E N D I X

Quinmester Post-Test Sample

QUINMESTER POST-TEST

NAME_____ DATE_____ SCORE___

The following items are multiple choice. Select the one you believe correct. Circle the letter provided at left of item.

1. For good health protection, the electric welding booth should be properly:

   a. sealed
   b. ventilated
   c. covered
   d. none of above

2. The most harmful rays emitted from arc welding are:

   a. ultraviolet, infrared, global
   b. ultraviolet, infrared, electric
   c. ultraviolet, infrared, gamma cosmic
   d. ultraviolet, infrared, polarity

3. A welding helmet is used to:

   a. protect the electrode
   b. protect your hair
   c. protect your lips
   d. protect your eyes

4. Gloves are worn to protect your hands from the:

   a. rays and sparks of molten metal
   b. rays and electricity
   c. electricity and sparks of molten metal
   d. molten metal and polarity

5. When the current setting of your electric arc welding machine is too low, the finished bead will be:

   a. too brittle
   b. too flat and irregular
   c. poor fusion and high bead
   d. undercut

6. The proper electrode size to use is determined by:

   a. the current setting of the machine
   b. the thickness of the metal welded
   c. the speed of welding desired
   d. the color of electrode

7. The DC machine is set for reverse polarity when:

   a. the electrode is positive
   b. the work is positive
   c. electrode is negative
   d. none of above

8. The DC machine is set for straight polarity when:

   a. the electrode is positive
   b. the work is negative
   c. the electrode is negative
   d. none of above

9. The function of the coating on the electrode is to:

   a. keep the metal hot
   b. stabilize arc and keep impurities out of the weld
   c. maintain tensile, strength of metal
   d. provide color for code marking

10. The distance the welding rod is held from the surface being welded establishes:

   a. the length of the arc
   b. the length of the electrode
   c. the increase in voltage
   d. none of above

11. Scratching the end of the electrode on the rough surface to be welded produces the:

   a. preheat
   b. adjustment
   c. weave
   d. arc

12. The size of the electrode used controls:

   a. the amperage flowing into the weld
   b. the angle cut
   c. the butt joint
   d. none of above

13. The two things that govern the quality of the electric arc weld:

   a. preheat and amperage
   b. angle cut and voltage
   c. uniformity of the arc and the amperage used
   d. current used and amperage

14. The sound produced by the correct arc length is:

a. sputtering
b. popping
c. bumping and dull
d. a sharp energetic crackle

15. The rate of travel of the arc will vary with:

a. the thickness of the metal being welded
b. the amount of current
c. the size and shape of the bead desired
d. all of the above

16. The length of a proper arc is:

a. about one inch long
b. approximately the diameter of the electrode
c. about 7/8 inch long
d. judged by the length of the electrode

17. The essentials of arc welding are:

a. correct current and correct polarity
b. correct travel speed and correct arc length
c. correct angle of electrode
d. all of the above

18. The angle of electrode when welding in the flat position should be approximately:

a. 10 degrees
b. 20 degrees
c. 90 degrees
d. 180 degrees

19. The pool formed by the arc is called a:

a. crater
b. pass
c. stringer
d. lap

20. Intermittent welding is a:

a. continuous weld
b. long weld
c. weld that is cracked
d. weld that is not continuous

21. Polarity is not a factor when welding with:

a. AC current
b. DC current
c. residual current
d. none of above

22. To maintain the correct arc length the rod must be:

a. lifted up one inch
b. fed downward at a constant rate
c. touching the work
d. none of above

23. To form the bead the arc must be moved:

a. until it spatters constantly
b. until it pops constantly
c. moved forward at a constant rate
d. none of above

24. The general types of electrodes are:

a. carbon, coated and bare electrodes
b. bare, coated and plastic electrodes
c. coated, bare and open electrodes
d. bare, carbon and paper electrodes

25. Incorrect polarity will produce

a. a good weld
b. an inferior weld
c. no weld
d. none of above

QUINMESTER POST-TEST ANSWER KEY

1. b
2. c
3. d
4. a
5. c
6. a
7. a
8. c
9. b
10. a
11. d
12. a
13. c
14. d
15. d
16. b
17. d
18. c
19. a
20. d
21. a
22. b
23. c
24. a
25. b

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